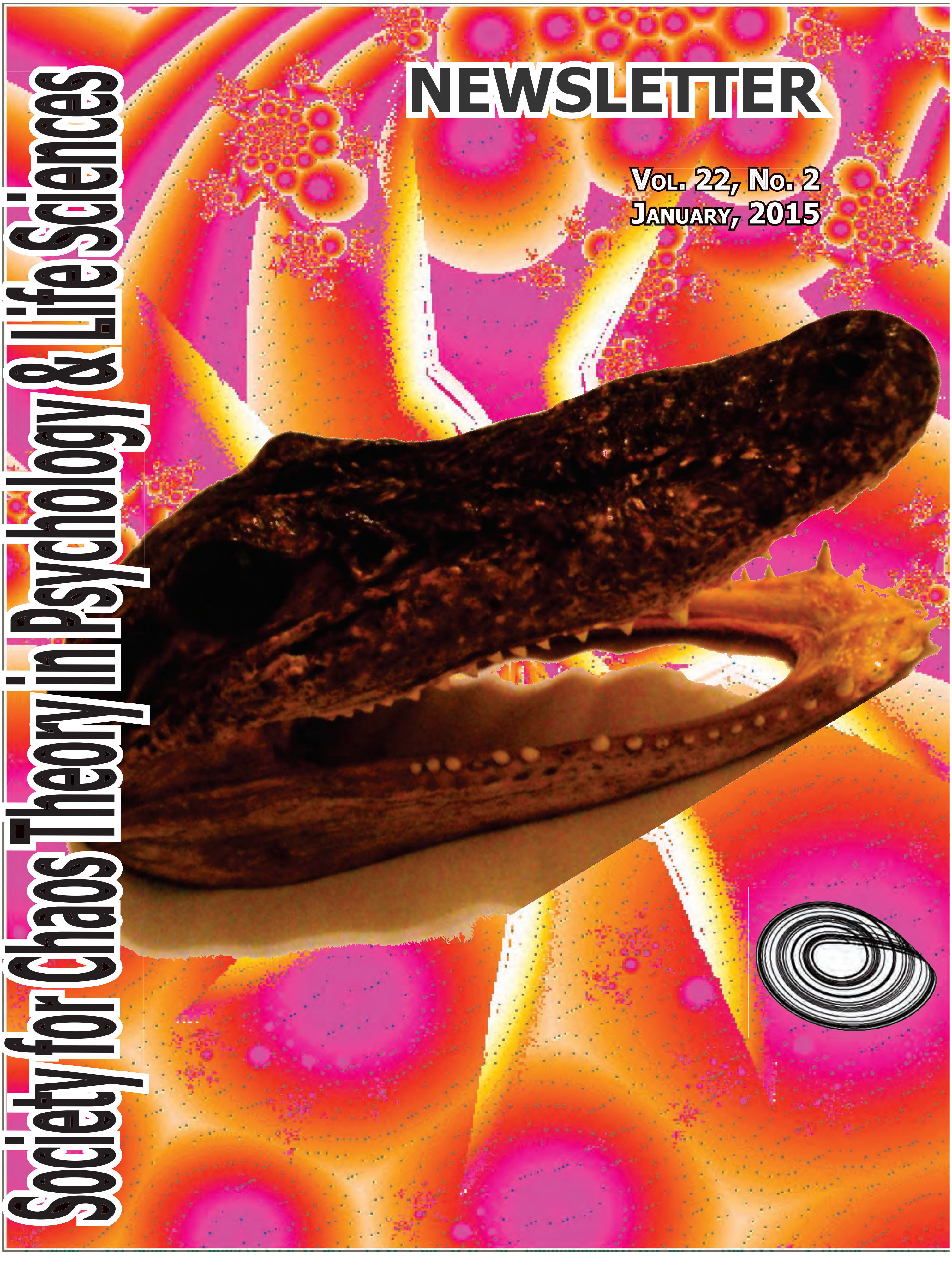

Society for Chaos Theory in Psychology & Life Sciences

NEWSLETTER

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January, 2015

Society for Chaos Theory in Psychology & Life Sciences

25th Annual International Conference
29-31 July, 2015
University of Florida, Gainesville, FL, USA

AN INVITATION TO OUR CONFERENCE

Sara Nora Ross
2015 Conference Chair

Celebrating 25 years!

Celebrating the 25th consecutive year of annual conferences, the 2015 Annual International SCTPLS Conference will be held in Gainesville, Florida, July 29-31, 2015, at the Harn Museum of Art and the Florida Museum of Natural History at the University of Florida

Our work has never been stronger or in higher demand. The Annual International SCTPLS Conference provides a one of a kind opportunity to showcase one's achievements, to keep up with advances in nonlinear science, and to network with international colleagues. Providing a small, focused conference with broad interdisciplinary and international scope, this summer is the time to share your interesting work among those who truly "get it."

Florida Museum of Natural History

Once again, the conference kicks off with a full day of workshops. The pre-conference workshop day for 2015 is under development - check back here for details and, if you're already a member, keep your eyes out for the announcements that come directly to your inbox!

In addition to our special invited guests, the 2015 conference will include single papers and symposia, 50-plus concurrent sessions and a poster session. Participants will include an international group of 60-70 psychologists, physicists, mathematicians, researchers and others who all share a common focus on the investigation and applications of nonlinear dynamics to psychology and the life sciences.

Five-Fold Sphere Projection Lap
by Eliasson (Harn Museum)

Apocalypse II, by Uelsmann
(Harn Museum)

Some critical conference dates:

NOW: Call for papers open.
March 23:early-bird abstract submissions will receive a reply shortly after this date.
April 30: call for proposals closes;
May 15: all acceptances finalized by the Conference Chair.

Everyone is looking forward to seeing you and catching up on your good work at the conference this summer

CALL FOR ABSTRACTS OF PAPERS, SYMPOSIA, and POSTERS

To present at the 25th Annual International Conference in Gainesville, Florida, July 29-31

Submissions deadline is April 30, 2015.

Early bird submissions deadline is March 10, 2015.* Submit early so travel plans get made early too!

Early birds get acceptance notices after March 23rd

Submit your abstract(s) electronically at http://www.societyforchaostheory.org/conf/2015/cfp

We invite interested scholars and scholar-practitioners to present and discuss recent developments in nonlinear dynamical system theory, which includes chaos theory, fractals, transition dynamics, and other complex systems behaviors related topics. Over the years, the annual conferences of the Society for Chaos Theory in Psychology & Life Sciences (SCTPLS) have inspired and supported scholars from an array of disciplines to look at new ways to develop their theoretical and empirical work in an integrated approach to life sciences.

Everybody knows the world is made up of processes from which patterns emerge, but we seldom give pause to *what this means* (Kelso, 1995, p. 3, emphasis added).[1]

The annual SCTPLS conference is the go-to event to report discovery of, recognize, and explore not only emergent patterns and the numerous scales at which they appear, but also their significance in our world! Nonlinear dynamics *cannot remain* one of the best-kept secrets on the planet!

We are an multidisciplinary organization. Topics welcome at the conference include applications of nonlinear dynamics theory and techniques to problems encountered in any area of the behavioral, social and life sciences including psychology, sociology, economics, econophysics, management sciences, anthropology, aesthetics, education, biology, physiology, ecology, neuroscience and medicine. One or more of the following nonlinear concepts must be an explicit part of the presentation: attractors, bifurcations, chaos, fractals, solitons, catastrophes, self-organizing processes, cellular automata, agent-based models, network analysis, genetic algorithms and related evolutionary processes, dynamical diseases, or closely related constructs. The broad mixture of the disciplines represented here indicates that many bodies of knowledge share common principles because they study common processes that produce similar patterns.

The program includes workshops, invited addresses, symposia, panel discussions, a poster session, and sessions of individual papers. Advances in basic or applied research, developments in theory, reports of empirical results and methodological papers are all welcome. We continue to encourage all nonlinear scientists, including graduate students who might be finishing up a dynamical thesis or dissertation, to share their ideas through paper presentations, chairing a roundtable session, or by proposing other alternative presentation formats, such as posters, product demonstrations, short workshops, or debates around controversial topics.

[1] Kelso, J.A.S. (1995). *Dynamic patterns: The self-organization of brain and behavior.* Cambridge, MA: MIT Press.

INSTRUCTIONS FOR ABSTRACTS

Length

- Abstracts should be between 150-250 words for posters, individual papers, short workshops and other alternative formats. The connection to nonlinear dynamics must be clear to the reader, as must be the nature and purpose of the work presented. Include organizational affiliation and contact information on each speaker or author.
- Abstracts may be up to 500 words for symposia or panel discussion. For symposia, abstracts should reflect the content of EACH speaker's contribution. The format for a symposium is for all speakers to give presentations, followed by or interspersed with discussion. Symposia should present current research within a coherent theme defined by the title and abstract.

Content

- For experimental work, the background, aims and framework, methods and samples, results, conclusions and Implications should be clear to the reader. For theoretical work, the background, aims and framework, mode of inquiry, outcomes, conclusions and implications should be clear to the reader.

- For panel discussions should provide a brief overview of the topic, and indicate the relevant background of the panelist and sample questions they will address. The format for a panel discussion is an introduction to the topic and the speakers, after which the panelists address as series of questions or issues (rather than just giving a series of presentations).
- **For all abstracts:** The connection to nonlinear dynamics, chaos, complexity, fractals or related concepts should be clear to the reader. Please stress what is the overall value added to the field (e.g. new method, new information, new perspective or issue, valuable confirmation of the present knowledge, adds clarity to present understanding). The web-submission form will require checking the categories that best represent your submission. Choose from:

1) **Empirical** (e.g., presentation of empirical results of a study), 2) **Theoretical** (e.g., empirically testable theoretical development), 3) **Applied** (e.g., organizational, business, product development or marketing, or involving clinical interventions), 4) **Quantitative** (e.g., computational or statistical modeling); 5) **Qualitative** (e.g., non-quantitative analysis of empirical data); 6) **Philosophical or artistic** (e.g., epistemology, philosophy of science, aesthetics, or audio-visual demonstrations)"

- For workshops should present state-of-the-art information on techniques useful for conducting research or applications of nonlinear science in the behavioral, social and life sciences. They should be pedagogical in nature. Where applicable, the abstract should emphasize skills that attendees can expect to acquire.

Each person submitting is limited to a maximum of two presentations as first author. It is acceptable to be a co-author on additional work submitted by others.

Trouble submitting?

If your submission is received successfully you will be taken to a confirmation page, with a link to follow for any future edits. If you have repeated trouble making your submission, as a back-up option please feel free to send all of the relevant submission information directly to Conference Chair Sara Nora Ross (sara.nora.ross[at]gmail.com), who can make sure that your submission is successfully loaded into the system.

PUBLICATION OPPORTUNITY

All presenting conferees are further invited to prepare their papers for review and possible publication in the Society's research journal Nonlinear Dynamics, Psychology, and Life Sciences. NDPLS is peer-reviewed and abstracted in PsycInfo (Psychological Abstracts), Medline (Index Medicus), JEL/Econlit, MathSciNet, and other important databases. NDPLS uses American Psychological Association (APA) style. Click JOURNAL on the SCTPLS web site to access Instructions for Authors. All SCTPLS members receive NDPLS and the SCTPLS Newsletter as a benefit of membership. NDPLS accepts manuscripts all through the year, but please use October 1, 2015 as the target date for submitting conference-related papers; the journal would like to have as many articles based on conference presentations as possible ready for the same issue.

VENUE

The 2015 SCTPLS Conference will be held (primarily) at the Harn Art Museum, at Univ. Florida, Gainesville. Access to the Harm art exhibits are part of your SCPLTS registration. You can see more about Harn here: http://harn.ufl.edu.s179884.gridserver.com/collections
The banquet Thursday night will be held at the Florida Museum of Natural History, which is just a couple buildings away from Harn. The Florida Museum is the largest natural history museum south of the Smithsonian and the largest university-based natural history museum in the country (in terms of combined collections, staff and facilities). The Museum is more than 100 years old, and has been at UF since 1906. Learn how it has grown from a small collection of teaching specimens into an international powerhouse for research and education. Entrance to the museum exhibits is included with your SCTPLS registration. SPECIAL FEATURE: FMNH has an exceptional exhibit on butterflies and their ecology. One of their prize exhibits, the LIVE BUTTERFLY ROOM, will be on displays for us at the banquet. Be there!

Feature Article

Developing a feel for nonlinear systems: How to work with impossible problems

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An earlier version of this paper was presented as a Keynote Address to the Annual International Conference of the Society for Chaos Theory in Psychology and the Life Sciences (SCTPLS), Milwaukee, WI, August 2, 2014.

Introduction

This newsletter article discusses how useful some of the basic properties of nonlinear dynamics can be for social scientists and for people who want to change the world for the better. It then sounds a cautionary note, describing excesses of systems thinking through the years and noting some mistakes to avoid as we update classical approaches to cybernetics and think beyond homeostasis. It is particularly interesting to consider the ways that systems misbehave and their seeming perversity. How do we get things done in a nonlinear world? Healthcare reform is used as an example of a fruitful area for nonlinear practice, for honing our skills at approaching the impossible. The paper ends on a note of hope for the future with a discussion of millenials in the new millennium. I hope that this brief article raises your excitement about approaching daunting, seemingly impossible problems that involve nonlinear functions, multiple interacting processes, and sometimes baffling outcomes.

What studying nonlinear dynamics gets us

Nonlinear relationships are omnipresent in biological, social and psychological systems. For example, in the area of health interventions, a very general dose-response graph that plots the effects of different doses of a nutrient or of a therapeutic agent has a roughly U-shaped curve, with the effects of deficiency at low doses at the left, an optimum region in the middle, and toxicity at high doses (Blumenthal & Garrison, 2010). While the curve is interesting and useful in itself, the consequences of nonlinearity become particularly interesting when a system changes over time. Simply put: **Nonlinear + Dynamics = Nonlinear Dynamics.**

What nonlinear dynamics get us is a set of problems which lack analytic solutions; only numerical approximation may be available, something that by itself can make problems seem intractable. We also see the stigmata of nonlinear dynamical systems, "catastrophe flags and other dynamic systems indicators" (Keating & Miller, 2000). These interesting, sometimes confounding behaviors, include catastrophes and chaos and are what first attract some of us to dynamical systems; they include such qualitative changes in system regimes as bifurcations, tipping and catastrophes, and the possibility of chaos, as well as the beautiful order in disorder of fractal phenomena. Chaos in turn gets us systems characterized by unpredictability, with sensitivity to small inputs and initial conditions. In human and engineering terms this can mean flexibility, adaptability, the possibility of emergent novel behavior, self-similarity and patterning, style, consistency in the face of intra-individual change, and seemingly miraculous creative behavior coming from deterministic models. Important here, this complexity can come from simple ingredients.

Hubris and new methodologies

These are exciting things! But, it is important to realize the limitations of any new methodology and keep in mind that we can't manage everything, to avoid the defining sin of modernism. One can argue that nonlinear dynamics represents an anti-ideology and thus is not prone to excesses, but I doubt that. It is crucial to grasp the pitfalls that come from uncritical embrace of various modes of thinking: Positivism, cause and effect, correlational methods, experimental design. It is worthwhile spending some time considering theoretical excesses and "boosterism." Some of these excesses are those of technocratic high modernism (Scott, 1998) and originate with confusing map and territory and attempting to make messy and complex reality correspond to our models. We as nonlinear dynamicists are not immune to these excesses. It pays to look at a few.

General Systems Theory's heyday in the 1940's through 1960's produced a systems boosterism, including the notion that systems thinking could solve most difficult human problems (although the approach also uncovered intractable ones in humans' relation to the environment). This also led to a general sense of the benevolence of systems. Cybernetic self-regulation (we'll return to this) was presumed to make things work out in the end. Combined with ideas of rationality in economic decision-making, the idea of self-regulation led to a valorization of economic markets that could cure all ills, despite the need to invoke "externalities" to account for obvious market failures.

Another example of destructive *hubris* from the past, with origin stories that overlap with our own field, is Systems Analysis, planning and decision-making emphasizing quantification and employing new data processing technologies to understand and predict. An interesting exploration is contained in former Secretary of Defense Robert McNamara's self-criticism of tactics in World War II and Vietnam (Morris, 2003). During the Cold War, game theory and a narrowly rational approach to decision-making reached a striking level of absurdity (Erickson et al., 2013).

We are not immune to nonlinear boosterism either, sometimes seeing fractals everywhere and engaging specifically in chaos boosterism. Here chaos is viewed as healthy, a non-relative virtue, a systems *summum bonum*. This leads to the question, "Is more chaos better," and to a strange linear nonlinearity position where more and more chaos is better and better (or perhaps just an optimum amount). Another area for excess involves utilizing analytic techniques of attractor reconstruction and finding chaos everywhere, in all data (Sprott, 2003).

We are currently seeing Big Data boosterism. Proponents suggest that with rapid analysis of sufficiently large amounts of constantly updating information, almost any difficult problem can be solved. Thus, Netflix' analytics may know my content preferences better than I do myself; perhaps I ought to allow it to use my credit cards on its own. Recent research (Youyou, Kosinski, & Stillwell, 2015) indicates that analysis of Facebook likes can predict self-rated personality characteristics better than our own mothers! As much as possible, let's not repeat old mistakes as we proselytize the benefits of nonlinear dynamics.

One can err both by over simplifying and by making things too complicated. An important distinction concerns things that are complicated vs. complex. "Complicated" describes the construction of a system's mechanism or structure. "Complex" refers to the behavior of the system observed over time. Most important for our purposes, simple systems can have complex behavior. Thus, when pondering the complex behavioral output of a system, it is not necessary to invoke models for the system that are unduly complicated in their construction. There has sometimes been a confusion – I believe – between fractal behavior and fractal structure, for example Goldberger's proposal (Goldberger, Rigney, Mietus, Antman, & Greenwald, 1988) that complex patterning of heartbeat might derive from fractal structure in the heart's nerves and muscles. This is an unnecessary design constraint.

This leads to the importance of Somewhat-Complicated Systems (SCS; Schuldberg, 2006). These are relatively simple models that can have very interesting, realistic, and technically complex behavior, including the possibility of chaos. Let's remain mindful of nonlinear dynamic boosterism and *hubris*, while still remembering that useful and reality-based problem-solving requires a nonlinear dynamics program. Because of many nonlinear systems' inherent unpredictability, embracing this program will not necessarily yield us the precise prediction and control dreamt of under a modernist agenda.

Cybernetic self-regulation: Is the helmsman losing his/her grip?

Self-regulation has played an important role in General Systems Theory and is a key concept to update now. I'm referring here to the mechanisms of cybernetics and Control Theory (Ball, 2003) based on regulative and feedback systems. Classic conceptions of feedback, particularly in the popular mind, view regulative and self-regulatory processes in oversimplified terms in both functioning and dynamics. This oversimplification can be destructive. Cybernetic processes have overemphasized linear response, clear, consistent, and instantaneous information transfer, giving insufficient attention to the evolutionary necessity for organisms to deal with unclear, incomplete, degraded, noisy, delayed (Glass, Beuter, & Larocque, 1988), and asymmetrical information, and to employ mixed messages (Bakhtin, 1981; Bateson, 1972). Nonlinear dynamics allow us to understand the resultant effects on systems' behavior.

In fact, persistent and pesky issues in control systems have been well known to the mathematicians and engineers designing and working with them for a long time. Examples are overshoot (e.g., as an automotive cruise control comes up to speed), bang-bang servo mechanisms (where the gain is too high in a servo mechanism and a piece of machinery hits its mechanical stops), and runaway systems (as in audio feedback). It is important to consider both positive and negative feedback, as well as feed forward (Maruyama, 1963; Schulkin, 2003). In the case of the iconic Watt steam engine governor, Maxwell (1868) described four different kinds of motion, only two of which represent regulation. This has been developed further in current work on chaos and bifurcations in mechanical governors (Zhang, Mello, Chu, Li, & An, 2010). What, then, do we mean by stability and self-regulation? Where do we go from here in conceptualizing regulation, stability, and even an organism's consistency over time (Fleeson & Noftle, 2008; Shoda, Tiernan, & Mischel, 2002)?

This implicates chaos as opposed to homeostasis in physiological, psychological, and social self-regulative systems; here we owe a debt of gratitude to Ary

Goldberger (Goldberger, 1991) and colleagues. We need to characterize better those systems where fluctuations are maintained within limits, that involve dissipative processes, and where behavior exhibits balance and order, yet in very dynamic ways. This suggests extending our consideration to broader mathematical notions of stability. Dick Field and I (Field & Schuldberg, 2011) are attempting to characterize steady states, stable or stationary, in homeostatic systems. The idea of regulation needs to be extended.

Systems perversity and intractability

The field of disaster science has much to teach us about how a system can go out of control, collapse, or change suddenly, for both good and ill. A variety of terms are current for these phenomena, including unintended consequences (very evident in social policy), nemesis effects in medicine (Illich, 1976), tipping (Gladwell, 2000), perverse incentives, biting back, revenge effects (Tenner, 1996), blowback (Johnson, 2001; Simpson, 1988), ironic effects (Wegner, 1994), and normal accidents (Perrow, 1999).

Considering how it is that people of good will can do terrible damage brings us to the idea of systems pathology. Several authors have developed useful typologies of systems problems and approaches to each. Plsek (2003) distinguishes between simple, complicated, and *complex* problems. A simple problem would be baking a cake using a recipe. A complicated problem could involve sending a rocket to the moon; while daunting, this problem can in principal be broken into small steps, subcomponents amenable to recipes. In contrast, raising a child is a *complex* problem, something for which there are truly no recipes! There is also important work on more generally conceived *intractable* problems. Robin Vallacher and colleagues (Vallacher, Coleman, Nowak, & Bui-Wrzosinska, 2010) are writing about intractable international, inter-ethnic, and political conflict. Another place to look for ways to approach complex systems phenomena is through work on agriculture, particularly contrasting mechanized modernist approaches to more appropriate methods.

This leads us to important question of how to work with Plsek's (2003) complex problems, often intractable and seemingly perverse troubles emerging from the behavior of systems – sometimes relatively simple ones -- that are manifesting complexity in their behavior. The conclusion of this article uses health care reform as a contemporary example.

Intractable problems and the nonlinear practitioner

It is nothing new that special methods, somewhat different from classical theoretical analyses, may be required for dealing with some special classes of problems, and there is much to learn about systems problem-solving through the ages. An important account of such early nonlinear practice is Aristotle (1962)'s Practical wisdom. Aristotle frames this as a question central in contemporary positive psychology (Seligman & Csikszentmihalyi, 2000), how to live a good life:

> "...the whole account of matters of conduct must be given in outline and not precisely...; matters concerned with conduct and questions of what is good for us have no fixity, any more than matters of health. ...the account of particular cases is yet more lacking in exactness; for they do not fall under any art or precept but the agents ... must in each case consider what is appropriate to the occasion, as ... in the art of medicine or of navigation" (*Nicomachean Ethics*, Chapter 2).

It is interesting that he uses medicine, a prime concern here, and navigation as exemplars. A discussion of working with such complex problems that are "lacking in exactness" leads us to heuristics, procedures, algorithms without guaranteed solutions, rules of thumb, and a computational, probably distributed processing approach. As one example of heuristics, an expert called upon to prevent a near disastrous and catastrophic meltdown of Detroit's Fermi reactor in 1966 explained, preparing to move the control rods: "We will go at this very, very slowly" (Fuller, 1984).

This also suggests attending to intuition's place in problem solving, the role of unconscious processes in answering complicated multivariate problems that swamp our conscious skills (Handley & Runnion, 2011), and the use of emotion in thought. At the same time it is also important to keep in mind potential drawbacks of relying on intuition, including bias and the risks of ignorant recommendations to "just go with your gut;" this can devolve into an anti-empirical anti-scientific ideology.

Herbert Simon (1979) describes satisficing, a process of coming up with good-enough but imperfect solutions within constraints. Satisficing contrasts with optimizing and maximizing: "Since the [model] organism, like those in the real world, has neither the senses nor the wits to discover an 'optimal' path -- even assuming the concept of optimal to be clearly defined -- we are concerned only with finding a choice mechanism that will lead it to pursue a 'satisficing' path, a path that will permit satisfaction at some specified level of all its needs" (Simon, 1979, p. 27). Other useful processes include sophisticated trial and error techniques, tinkering, twiddling (Sundararajan, 1996), and bricollage (Levi-Strauss, 1966).

Because these approaches involve grasping the Somewhat-Complicated Systems underlying the complex behavior in the thorny problem we want to understand, it is important to develop skills for finding useful mechanisms to work with. This is a hands-on approach where it is crucial to choose the level of description of ones models, the places where one wants to intervene, with care. For example, in my field of mental health care and psychological intervention there are historical tendencies and temptations to begin at the physiological level; perhaps it is the most fundamental. However, this is not always or even usually the best level for intervention in problems of daily living, behavioral and social conundrums, and quality of life. Often it may be better to conceptualize problems and to try out solutions using descriptive language and causal models that are psychological, behavioral in a wide sense (Staddon, 2001), perhaps cybernetic, models that involve notations for describing communication. These levels for description and practice are in some sense grammatical (Wittgenstein, 1953/1958) and involve information and its organization. If the practitioner is lucky, some of the things discovered will demonstrate substrate invariance (Dennett, 1996), allowing work with self-similar processes at different scales, what psychotherapists call parallel process. This lets us generalize what we have learned about systems to different levels of organization. In attempting to approach or solve intractable problems, up-leveling and down-leveling in choosing variables and levels of analysis are important heuristics for systems thinking, a methodological parallel to choosing appropriate technology.

What does it mean to be good at working with impossible problems?

One term for such skill is *finesse* (Tenner, 1996, p. 352), described as “abandoning the same kind of frontal attacks that rely on the same … properties that led to revenge effects in the first place.” *Mētis* (Scott, 1998) is another, and it is local, contextual, and distributed, not epistemic yet data-driven. This article describes *feel*, with an analogy to the complicated motor learning exemplified by driving a car with a manual transmission and learning how use the clutch. We know about quite a few heuristics for developing such feel. An aphorism from Alcoholics Anonymous, “Fake it ‘til you make it,” describes one way for attaining expert knowledge; another involves imitation. Teaching stories (Hunter, 1991) play an important role in professional training and craft, the art of medicine, artisanal and expert practice, and the dissemination of practical technology and innovation.

Reform in Medicine and Health Care

Observations about health care reform provide examples of the kinds of problems and potential solutions developed here. The U-shaped nonlinearities in the simplest sorts of relationships linking health-producing attributes and healthy outcomes, therapeutic practices and their effects, were mentioned at the beginning. At many levels seeking or improving health involve dose-response nonlinearities, treatment-treatment interactions, and time delay (Rowland, 1972); the mechanisms and structures of delivering and planning care are multifactorial, multivariate and involve multiple causation and large and coupled, although modular, networks. Controlling or steering our own bodies or larger systems of care all seem intractable; so does predicting the course of any such endeavor. The complex properties of health as a systems problem have become clear in critiques of medicine since the 1960’s (Illich, 1976), and they were also foreshadowed by some prescient physicians of the early twentieth century. They also can be seen in paradoxes involving our satisfaction with our health care, concerns regarding quality and access to services, and the cost-quality conundrum, where more spending can lead to poorer outcomes.

A Somewhat-Complicated Systems approach suggests that both seeking wellness at a personal level and improving care at a systems level may be amenable to relatively microscopic, even simple rules for change. This is indeed the approach taken in some of the current initiatives under the Affordable Care Act, and in the Institute of Medicine’s 10 simple rules for reforming health care (Committee on Quality of Health Care in America, 2001). Again, this approach means distinguishing between what is complicated and what is complex. The overall health care system is indeed complicated in its mechanisms, its practices, economics, and regulations; its behavior is complex and sometimes perverse. Nevertheless, it may have relatively simple subunits that are only *somewhat* complicated given a well-chosen level of analysis.

We can engage in healthcare and its reform via mechanisms at the bottom, mechanisms that are grabbable. The IOM’s first simple rule (Care Based on Continuous Healing Relationships) represents such a mechanism-level approach, viewing interventions and their effects in a long-term perspective that is contrary to economic short-termism. Simple Rule 4 (Shared Knowledge and the Free Flow of Information), as well as Rule 7 (Need for Transparency) and Rule 10 (Cooperation among Clinicians) delineate data-flow and control mechanisms for information within and across subsystems. At the same time as we implement such heuristics for improving care, it is also important to remember that even Somewhat-Complicated Systems are capable of complex behavior, and even as we seek to change it, the healthcare system is to a large extent unpredictable and incompletely fathomable. These things are nothing new to clinicians treating patients, who are used to dealing with uncertainty and a lack of universally applicable prescriptions, and to having only tenuous control over the patient and the patient’s world.

Four sample initiatives going on at present in health care provide examples of directions to pursue. The first of these is Interprofessional education (IPE; World Health Organization, 2010), an approach to training healthcare providers together about how to work collaboratively and cooperatively across disciplines and professions. A second is Integrated Behavioral Health Care (O'Donohue, Cummings, Cucciare, Runyan, & Cummings, 2006), mental health services situated and delivered in the context of primary care. This breaks down the distinction between mental health assessment and treatment and the rest of health care, acknowledging the roles of behavior on physical health and physical health on behavior, mind and body. A third – and this includes the first two – is the Patient-centered medical home model included in the Affordable Care Act. Finally, implementation (and improvement) of the Electronic Health Record, another component of the ACA, aims at improving access to information across providers, across systems and subsystems

Getting good at doing the impossible: A feel for nonlinear dynamics

What does this all talk about finesse and feel, skills for working with complex systems, have to say about the education and training of our students? How do we need to change what and how we teach? First, it seems that fostering systems learning -- and teaching *feel* -- require experiential methods; I will discuss the importance of computer-based simulations in a moment. Also – and this is something of an old-school belief –how we think has evolved as our bodies have evolved and cognition is embodied. Different forms of thinking – particularly those involving heuristics – will involve multiple movements and experiences, different parts of our bodies, not just our thumbs or our fingers on a keyboard. Play and ad hoc experimentation, outdoor experiences and physical activity (this is also mental activity, of course) are important, and not just organized sports.

Levi-Strauss (1966), studying cultures relying on hunting, noted that animals are good for thinking as well as eating. There are many other things that are good for thinking about systems, including (this is again somewhat retro) paper and pencils, computational visualization techniques, and lower-tech visual tools. We need to train our children to spot nonlinear “flags” (Keating & Miller, 2000). I personally have gotten a lot of good from thinking about agriculture; a number of crucial concepts for dealing with highly complex phenomena eluding technocratic modernist solutions have come from people writing about agriculture and appropriate technology.

I also want to argue strongly for the utility of *toy models*, and I am particularly fond of this approach. Toy models are simple, illustrative, mechanical or abstract models that open the door to more complex phenomena. They provide a bracing tonic against boosterism because they are humble, quotidian, and evoke the ideas of everyday language (Wittgenstein, 1953/1958) and everyday creativity (Richards, 2010). They are also fun. I believe that *a toy is also a notation***.** One example is an Oregonator-like model of stress and social support model described by Dick Field and myself (Field & Schuldberg, 2011).

This brings us to our interactions with our millennial children, and to what we can expect in the new millennium, already a decade and a half old. What is the hope for the future? One thing about many of our children, raised with widely available computer and network technology, is their familiarity with simulations. I do have concerns that computer play can occur partially at the expense of engaging with nature, taking apart machinery, and fantasy play with real world props and bodily enactment; however, there are also things that computer-based simulations can do that were not available in my childhood. These playable simulations can provide experiences that help the player develop feel for very complex economic, social, political, and cultural phenomena. Examples include the videogames *Sim City*, *Tropico*, and *Kerbal Space Program*. Also important are the immersive and interactive (if sometimes addictive) virtual worlds of *World of Warcraft* and *Second Life*.

Conclusions

This article argues that it may be possible to get a grip on complex systems using humble, only Somewhat-Complicated tools. Teaching our students about complexity’s implications for life in our world and for changing it for the better require teaching humbleness, with clear-eyed attention to the messy, complicated, imperfect, non-analytic, unpredictable, and only partially controllable systems making up daily life. Playing with and learning from simple models needs to include respect for contingency and the incremental, algorithmic complexion of our world. We must convey that understanding abstract models and simplified maps does not allow us to scale up this feel into near-perfect technological solutions. This is something we will need to watch for in the rise of boosterism in predictive analytics and Big Data. In the area of healthcare reform specifically, we must avoid old forms of systems *hubris* while still maintaining hope in the utility of the practical heuristics we can apply for making the world a better place.

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News from Members

Edited by David Pincus,
Associate Professor, Chapman University
Past President, SCTPLS

Hello Members of SCTPLS,

To celebrate the New Year, we asked you, the members, to share your professional plans for the upcoming year: new projects getting started; old projects getting completed; new results to explore; promotions and accolades; dreams and aspirations…

What we received was a little bit of everything. Please take a look and see what your colleagues will be up to this year. Because if WE don't know what WE are doing, WHO will?

Doris Bergen, Dist. Prof. of Educational Psychology, Emerit, Miami University, Oxford, OH

The goal that will be achieved this spring is the completion of a book on how technology-augmented play may be influencing the brain maturation and developmental trajectories of children and adolescents. The dynamic systems perspective is being used as one of the major theoretical themes that informs the book's perspective.

Xavier Bornas, PhD
Department of Psychology
University of the Balearic Islands, Spain

I am a full professor at the department of Psychology, University of the Balearic Islands (Mallorca, Spain). I teach one course on Neurodynamics (master degree in Neuroscience) and one course on Dynamical Systems and Psychopathology for Psychology undergraduate students.
Specific results from the research project I just finished have been recently accepted for publication in Motivation and Emotion. The title of the article will be "Allometric control of daily mood and anxiety fluctuations", and we report that these fluctuations show multistabilty and are under allometric control. This means that in addition to real-time homeostatic control there are other control mechanisms operating at different time scales. There is one more recent paper reporting results from the same research project in Cognitive Neurodynamics.
The new project I'm involved in is about emotional trajectories in early adolescents. Though this is a still running longitudinal study, one interesting part of the project focuses on heart rate complexity in adolescents. We have found differences in the fractal dimension and entropy of heart rate time series from low- and high-anxious students (these results have not been submitted yet). Another part of the project, starting in spring, will focuse on self-reported mood and anxiety. We hypothesize that highly anxious students will show less complexity than low-anxious participants in their self-reported data.
Finally, I'm trying to analyze finger-tapping data from ADHD children and compare results with the same data obtained from non-ADHD children. The main purpose of this "study" is to find out if a simple motor task (i.e. without cognitive load) allows us to distinguish between these groups.

Doris Pronin Fromberg, Ed.D.
Professor Emeritus
Hofstra University

2015 publication activities:
Book: (2015). *Play from birth to twelve* (co-edited with D. Bergen). Routledge.
Chapters:
(2015). The simplicity of complexity: Early childhood teacher education for prekindergarten/kindergarten. In S. Recchia & L. Couse (Eds.). Handbook of early childhood teacher education. Routledge.
(in production). *The fractal dynamics of early childhood play development and nonlinear teaching and learning*. In M. Koopmans & D. Stamovlasis (Eds.), Complex dynamical systems in education: Concepts, methods and application. Springer.

Advocacy: NYS Governors Early Childhood Advisory Council, member; NYS Association of Early Childhood Teacher Educators, board member; Defending the Early Years, national member; Long Island Early Years Institute, member

Russell S. Gonnering
Clinical Professor of Ophthalmology
The Medical College of Wisconsin

My major activity continues to be the application the tools of non-linear dynamics to healthcare improvement. At this point, this is primarily at the VA Medical Center here in Milwaukee. Dave Logan and I are exploring new opportunities to use agent-based modeling in order to understanding organizational performance in general. There may be chances to unite modeling with complementary methodologies, and we are excited about this. I am constantly amazed at how many people are looking at the same jewel through different perspectives. We see exciting and sparkling facets, but sometimes forget the view from the other side of the jewel is just as compelling, if not more so. The challenge is in uniting these views to, if I may, "See the holism of complexity". I would love to find an organization as excited with that prospect as am I. If you know of such a place, pass it on to me!

John M. Gottman, Ph.D
Relationship: Research Institute & The Gottman Institute
Licensed Clinical Psychologist
Deer Harbor, WA.

I just published a book called *PRINCIPIA AMORIS: The new science of love,* about our nonlinear differential equations modeling of couples' interaction. I plan to continue to explain the math to everyday people and couples' therapists this year. There may be a cover story in Psychology Today on our work. This year, with Paul Peluso, we have been successfully applying this math modeling to psychotherapy with therapist and client in a new lab of Peluso's. I am going to be trying to extend the work to father-mother-infant interaction (with 3-month-old babies), so we will have three nonlinear equations, with new possibilities for chaos and fractal geometry.
I would be willing to write a review article for our journal summarizing our findings for couples (both hetero- and same-sex couples).

David Katerndahl, MD
Department of Family & Community Medicine
University of Texas Health Science Center at San Antonio

I am a physician faculty member at the University of Texas Health Science Center at San Antonio completing two studies on intimate partner violence funded by the National Science Foundation and NIAAA. The first seeks to explain why women in violent relationships demonstrate nonlinear patterns of decisionmaking. The second involves violent couples and uses state space rid analysis to understand the relationship between alcohol intake and violent behavior.
Occupational Therapy Assistant Program, Oak Ridge, TN
2015 Goals: #1: Look for a new work situation and be in it by the end of this summer. #2: Look for co-writers to help me put my MANY book and article ideas as well as their ideas into language that can give chaos theory and complexity science topics more mass appeal ASAP.
A Couple of My Many Book or Article Ideas

Stanley Krippner, Ph.D., is a faculty member at Saybrook University, which hosted the first meeting of this Society. Currently, he is supervising student dissertations and working on a book about the legendary Native American medicine man Rolling Thunder.

Larry S. Liebovitch, Ph.D.
Queens College, City University of New York: Department of Physics and Department of Psychology
-Columbia University: Adjunct Senior Research Scholar: Advanced Consortium on Cooperation, Conflict, and Complexity at the Earth Institute.

For 2015: I) continuing our analysis of video-recordings of therapist-client interactions in psychotherapy; ii) extending our models of how people interact (Physica A 387:6360-6378. doi: 10.1016/j.physa.2008.07.020) to up to 2K people connected in a small-world network; iii) teaching introductory physics and modern physics (special relativity and quantum mechanics)

Alan McDonnell

Currently I am looking for collaboration with universities interested in examining how different cultural groups collaborate internally and scan the environment for acquisitive opportunities to acquire resources, and the role of culture in their success or failure.I am thinking of an approach of attempting to identify biological power laws significant in exploiting environmental attractors capable of exerting long term behavioral changes Interactions with competitors and environmental revolutions/evolutions will also be incorporated along with conscious and unconscious cognitive processes.There is a preliminary expression of interest from the UK public sector contingent on finding university participation, and I would anticipate applying for funding to push this forwards and generate models with a Bayesian basis to generate probabilities of competition scenarios in economic activities selected by the public sector. Hopefully as this work will have public sector content, they may also provide decent tea and biscuits on a regular basis.

Janice Ryan, OTD, OTR/L,
Certified Human Systems Dynamics Professional
Chattanooga, TN, and Current Work Situation: Roane State Community College
1) The Seven Simple Rules for Healthy Family Engagements (Chapters of the book in no particular order yet. The final title is yet to be decided upon.)

- Teach through their strengths.
- Learn through your strengths and your mistakes.
- View each success as a family success.
- Recognize individual interests and abilities as opportunities for shared growth.

- Learn to use their love language.
- Respect their and your need for personal preference environments.
- Learn to feel when they need to be held.

2) This one is less developed but I believe very important to communicate. I don't know if you have seen the YouTube video of "Last Week: Tonight with John Oliver: Ayn Rand – How is This Still a Thing?" … but it is really worth watching. It exposes what I have been seeing for a while now… the emotional self-regulation patterns that existed in Nazi's during the rise of Nazism. These same emotional self-regulation patterns are now on the rise in our country and are presented daily on the supposedly honorable reports of Fox News. I don't know if anyone would be interested in writing an article or a book with me related to this topic. Since I love using music lyrics to attract more universal attention… we could borrow from Bob Marley (if that is OK to do) and call it: Exodus Movement of the People: Let's Stop Hiding from Reality in a World of Hypocrisy.

Nikos Varotsis PhD Psychology
Panteion University Athens

I'm Nikos Varotsis and I am a PhD in Panteion University of Athens Greece in Psychology Dpt. I've accomplished my dissertation and I'm preparing a publication with my tutor Professor Ioannis Katerelos about the implementation of nonlinear modelling in tax policy.

Wayne Wakeland, Ph.D.
Professor and Systems Science Program Chair
School of the Environment, College of Liberal Arts and Sciences' Portland State University, Portland, Oregon.

Current Projects: (1) Creating a computation model for the recovery from concussion. (2) Does a prescription drug monitoring program change prescriber behavior so as to reduce patient risk? (3) Using data mining methods to study data from an agent based simulation model. (4) Using prediction to validate a system dynamics model. (5) Evaluating policy interventions to reduce the diversion and abuse of opioid pain medicines.

Tobi Zausner, PhD, LCSW
School of Psychology and Interdisciplinary Inquiry
Saybrook University

My book *When Walls Become Doorways: Creativity and the Transforming Illness (Harmony/Random House, 2007)* will be coming out this year as an e-book. It is about the influence of physical illness on the creative process of visual artists and shows that instead of stopping artists, physical difficulties transform them, enhancing both their life and their work.

WE ARE HAPPY TO ANNOUNCE THAT *JANICE RYAN* IS OUR NEW SCTPLS SECRETARY

WELCOME JANICE!

Dear Society Members,

Janice Ryan
SCTPLS Secretary

Last week I was excited to learn that I will be entering 2015 as the new Society secretary. I couldn't be happier about having this opportunity!

As some of you may know, I view the beginning of this New Year as a great opportunity for us to develop a society of brains that includes the most intuitive practitioners, brilliant scientists and computer savvy statisticians. Our collaborations will be world-changing!

My research and practice interests have surface diversity but deep pattern coherence related to the intra- and inter-generational bonding and evolutionary neurobiological influences of shared emotional experiences. These include the patterned memes and cultural values learned unconsciously and sought intuitively throughout the lifespan during music, drama, the arts and game play. My first publication was in *Emergence: Complexity & Organization* titled, "A Nonlinear Dynamics Approach to Exploring the Spiritual Dimensions of Occupation" (Champagne, Ryan, Saccamondo & Lazzarini, 2007). Current writing interests and presentation topics apply my previous work to positively influence emotional system patterns of dysfunctional families, work environments, economic / political systems and terrorist networks.

As a natural cross-pollinator, I combine my passion for psychology and life sciences with my practice applications of Human Systems Dynamics by using rule-based models to teach and coach health care professionals and healers. My current practice goal is to use my leadership position in the HSD Healing Hub to promote a health care system in America that honors the complexity of human system behavior. Most recently, the program I designed to facilitate better care and treatment of people with dementia through the use of Personal Preference Environments was published in *Adaptive Action: Leveraging Uncertainty in Your Organization* (Eoyang & Holladay, 2013).

I am looking forward to a fun year playing and working together!

Faithfully Yours,
Janice Ryan, Secretary, SCTPLS
Doctor of Occupational Therapy, Rx Tennessee Community College Alliance

References:

Champagne, T., Ryan, J., Saccamondo, H. & Lazzarini, I. (2007). A nonlinear dynamics approach to exploring the spiritual dimensions of occupation. *Emergence: Complexity & Organization, 9*(4), 29-43.

Eoyang, G. H., & Holladay, R. J. (2013). *Adaptive action: Leveraging uncertainty in your organization.* Standford, CA: Stanford University Press.

Nonlinear Dynamical Bookshelf

Bayés de Luna, A. (2014). ***ECG for beginners*. New York: Wiley.** Mastery of ECG interpretation is achieved not only by pattern recognition, but equally importantly, by a clear, practical understanding of how electricity moves through the heart and how disruption of that movement manifests itself via ECG tracings. ECGs for Beginners, written by one of the world's most respected electrophysiologists with over 40 years experience of training clinicians, will provide cardiology and electrophysiology trainees with an easy to follow, step-by-step guide to the topic, thus enabling them to both understand and interpret ECG readings in order to to best manage their patients. Packed with over 250 high-quality ECG tracings, as well as management algorithms and key points throughout, every chapter also contains self-assessment questions, allowing the reader to test themselves on what they've just learnt. All kinds of arrhythmias will be covered, as well as morphological abnormalities such as atrial and ventricular problems. Importantly, normal ECG readings will be presented alongside abnormal readings, to best demonstrate how and why abnormalities occur. ECGs for Beginners is an essential purchase for all cardiology and electrophysiology trainees, as well as being a handy refresher guide for the experienced physician. It also looks like an excellent resource for those engaged in nonlinear analyses of ECG and HRV.

Ben-Naim, A. (2014). ***Discover probability: How to use it, how to avoid misusing it, and how it affects every aspect of your life*. Singapore: World Scientific**. ISBN: 978-981-4616-31-7. This is a unique book which explains the concept of probability and its applications with almost no mathematics. As the title states, the reader will discover the concept of probability, learn how to use it, and be made aware of some misuses of, and sometimes even abuse of, probability. The reader will come to know that a basic knowledge of probability is useful in life. It is a novel, self-teaching book that is easy to read, oftentimes entertaining and full of useful information on both probability and information theory. The style is reader-friendly. It will appeal to anyone who is interested in the "laws" that govern our daily lives. The detailed examples in the book are taken from daily life which anyone can identify with. The last section introduces the Shannon measure of information and its relationship to probabilities.

Gottman, J. M. (2015). ***Principia Amoris: The New Science of Love.* New York: Routledge**. ISBN - 978-0-415-64156-2. From the author of *Mathematics of*

Marriage. Just as science has helped us to understand the physical world, it's now helping us understand the emotional world, too. In his new book, renowned family therapist John Gottman delves into the unquantifiable realm of love armed with science and logic and emerges with the knowledge that relationships can be not only understood, but predicted as well. Based on research done at his Love Lab and other laboratories, Gottman has discovered that the future of love relationships can be predicted with a startling 91% success rate. These predictions can help couples to prevent disasters in their relationships, recognize the signs of a promising relationship, and perhaps more importantly, recognize the signs of a doomed one. Principia Amoris also introduces Love Equations, a mathematical modeling of relationships that helps understand predictions. Love Equations are powerful tools that can prevent relationship distress and heal ailing relationships. Readers learn about the various research and studies that were done to discover the science behind love, and are treated to a history of the people, ideas, and events that shaped our current understanding. They also learn about: The “Four Horsemen of the Apocalypse,” 45 natural principles of love, 5 couple types, 5 recipes for good relationships, and much more!

Murthy, K. G. (2014). ***Computational and algorithmic linear algebra and n-dimensional geometry*****. Singapore: World Scientific.** ISBN: 978-981-4366-62-5. This undergraduate textbook on Linear Algebra and n-Dimensional Geometry, in a self-teaching style, is invaluable for sophomore level undergraduates in mathematics, engineering, business, and the sciences. These are classical subjects on which there are many mathematics books in theorem-proof style, but this unique volume has its focus on developing the mathematical modeling as well as computational and algorithmic skills in students at this level. The explanations in this book are detailed, lucid, and supported with numerous well-constructed examples to capture the interest and encourage the student to master the material.

Ostrovsky, L. (2014). ***Asymptotic perturbation pheory of waves*****. Singapore: World Scientific.** ISBN: 978-1-84816-235-8. This book is an introduction to the perturbation theory for linear and nonlinear waves in dispersive and dissipative media. The main focus is on the direct asymptotic method which is based on the asymptotic expansion of the solution in series of one or more small parameters and demanding finiteness of the perturbations; this results in slow variation of the main-order solution. The method, which does not depend on integrability of basic equations, is applied to quasi-harmonic and non-harmonic periodic waves, as well as to localized waves such as solitons, kinks, and autowaves. The basic theoretical ideas are illustrated by many physical examples throughout the book.

Tartakovsky, A., Nikiforov, I., & Basseville, M. (2015). ***Sequential Analysis: Hypothesis Testing and Changepoint Detection*****. Boca Raton, FL: CRC Press.** The book systematically develops the theory of sequential hypothesis testing and quickest changepoint detection. It also describes important applications in which theoretical results can be used efficiently. The book reviews recent accomplishments in hypothesis testing and changepoint detection both in decision-theoretic (Bayesian) and non-decision-theoretic (non-Bayesian) contexts. The authors not only emphasize traditional binary hypotheses but also substantially more difficult multiple decision problems. They address scenarios with simple hypotheses and more realistic cases of two and finitely many composite hypotheses. The book primarily focuses on practical discrete-time models, with certain continuous-time models also examined when general results can be obtained very similarly in both cases. It treats both conventional i.i.d. and general non-i.i.d. stochastic models in detail, including Markov, hidden Markov, state-space, regression, and autoregression models. Rigorous proofs are given for the most important results. Written by leading authorities in the field, this book covers the theoretical developments and applications of sequential hypothesis testing and sequential quickest changepoint detection in a wide range of engineering and environmental domains. It explains how the theoretical aspects influence the hypothesis testing and changepoint detection problems as well as the design of algorithms.

Xiong, B., & Li, P. Y. (2010). ***Mathematical Olympiad in China (2009-2010): Problems and Solutions*****. Singapore: World Scientific**. ISBN: 978-981-4390-21-7. The International Mathematical Olympiad (IMO) is a competition for high school students. China has taken part in the IMO 21 times since 1985 and has won the top ranking for countries 14 times, with a multitude of golds for individual students. The six students China has sent every year were selected from 20 to 30 students among approximately 130 students who took part in the annual China Mathematical Competition during the winter months. This volume of comprises a collection of original problems with solutions that China used to train their Olympiad team in the years from 2009 to 2010. Mathematical Olympiad problems with solutions for the years 2002–2008 appear in an earlier volume, *Mathematical Olympiad in China*.

Xiong, B., Zheng, Z., Liu, R., Zhai, M., & Lin, Y. (2010). ***Graph theory*****. Singapore: World Scientific.** ISBN: 978-981-4271-12-7. In 1736, the mathematician Euler invented graph theory while solving the Konigsberg seven-bridge problem. Over 200 years later, graph theory remains the skeleton content of discrete mathematics, which serves as a theoretical basis for computer science and network information science. This book introduces some basic knowledge and the primary methods in graph theory by many interesting problems and games.

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COMING SOON from NDPLS --

Special issues on ***Optimum Variability*** and ***SYNC!***

Genuine California Gopher sends his regards.

Newsletter Editor: Gaetano Aiello